

Titles of most frequently occurring classifications of patents returned
from a search of 10826954 on Dec 18 , 2006

14 324/754 (8 OR, 6 XR)
Class 324 ELECTRICITY: MEASURING AND TESTING
324/500 .FAULT DETECTING IN ELECTRIC CIRCUITS AND OF ELECTRIC
COMPONENTS
324/537 ..Of individual circuit component or element
324/754 ...With probe elements

5 324/72.5 (0 OR, 5 XR)
Class 324 ELECTRICITY: MEASURING AND TESTING
324/72 .TESTING POTENTIAL IN SPECIFIC ENVIRONMENT (E.G., LIGHTNING
STROKE)
324/72.5 ..Voltage probe

5 324/758 (4 OR, 1 XR)
Class 324 ELECTRICITY: MEASURING AND TESTING
324/500 .FAULT DETECTING IN ELECTRIC CIRCUITS AND OF ELECTRIC
COMPONENTS
324/537 ..Of individual circuit component or element
324/754 ...With probe elements
324/758Probe alignment or positioning

4 324/761 (4 OR, 0 XR)
Class 324 ELECTRICITY: MEASURING AND TESTING
324/500 .FAULT DETECTING IN ELECTRIC CIRCUITS AND OF ELECTRIC
COMPONENTS
324/537 ..Of individual circuit component or element
324/754 ...With probe elements
324/761Pin

4 324/757 (1 OR, 3 XR)
Class 324 ELECTRICITY: MEASURING AND TESTING
324/500 .FAULT DETECTING IN ELECTRIC CIRCUITS AND OF ELECTRIC
COMPONENTS
324/537 ..Of individual circuit component or element
324/754 ...With probe elements
324/757Probe contact enhancement

4 439/66 (4 OR, 0 XR)
Class 439 ELECTRICAL CONNECTORS
439/55 .PREFORMED PANEL CIRCUIT ARRANGEMENT, E.G., PCB, ICM, DIP,
CHIP, WAFER, ETC.
439/65 ..With provision to conduct electricity from panel circuit
to another panel circuit
439/66 ...Conductor is compressible and to be sandwiched between
panel circuits

3 977/875 (0 OR, 3 XR)
Class 977 NANOTECHNOLOGY
977/840 .MANUFACTURE, TREATMENT, OR DETECTION OF NANOSTRUCTURE
977/849 ..With scanning probe
977/860 ...Scanning probe structure
977/875With tip detail

3 324/762 (2 OR, 1 XR)
Class 324 ELECTRICITY: MEASURING AND TESTING
324/500 .FAULT DETECTING IN ELECTRIC CIRCUITS AND OF ELECTRIC
COMPONENTS
324/537 ..Of individual circuit component or element
324/754 ...With probe elements

324/762Cantilever

3 204/403.01 (1 OR, 2 XR)

Class 204 CHEMISTRY: ELECTRICAL AND WAVE ENERGY

204/193 .APPARATUS

204/194 ..Electrolytic

204/400 ...Analysis and testing

204/403.01Biological material (e.g., microbe, enzyme, antigen, etc.) analyzed, tested, or included in apparatus

3 257/E23.021 (0 OR, 3 XR)

Class 257 ACTIVE SOLID-STATE DEVICES (E.G., TRANSISTORS, SOLID-STATE DIODES)

257/E23.001 .PACKAGING, INTERCONNECTS, AND MARKINGS FOR SEMICONDUCTOR OR OTHER SOLID-STATE DEVICES (EPO)

257/E23.01 ..Arrangements for conducting electric current to or from solid-state body in operation, e.g., leads, terminal arrangements (EPO)

257/E23.012 ...Consisting of lead-in layers inseparably applied to semiconductor body (EPO)

257/E23.019Consisting of layered constructions comprising conductive layers and insulating layers, e.g., planar contacts (EPO)

257/E23.021Bump or ball contacts (EPO)

3 257/E23.078 (0 OR, 3 XR)

Class 257 ACTIVE SOLID-STATE DEVICES (E.G., TRANSISTORS, SOLID-STATE DIODES)

257/E23.001 .PACKAGING, INTERCONNECTS, AND MARKINGS FOR SEMICONDUCTOR OR OTHER SOLID-STATE DEVICES (EPO)

257/E23.01 ..Arrangements for conducting electric current to or from solid-state body in operation, e.g., leads, terminal arrangements (EPO)

257/E23.078 ...Flexible arrangements, e.g., pressure contacts without soldering (EPO)

2 257/751 (2 OR, 0 XR)

Class 257 ACTIVE SOLID-STATE DEVICES (E.G., TRANSISTORS, SOLID-STATE DIODES)

257/734 .COMBINED WITH ELECTRICAL CONTACT OR LEAD

257/741 ..Of specified material other than unalloyed aluminum

257/750 ...Layered

257/751At least one layer forms a diffusion barrier

2 257/E23.02 (0 OR, 2 XR)

Class 257 ACTIVE SOLID-STATE DEVICES (E.G., TRANSISTORS, SOLID-STATE DIODES)

257/E23.001 .PACKAGING, INTERCONNECTS, AND MARKINGS FOR SEMICONDUCTOR OR OTHER SOLID-STATE DEVICES (EPO)

257/E23.01 ..Arrangements for conducting electric current to or from solid-state body in operation, e.g., leads, terminal arrangements (EPO)

257/E23.012 ...Consisting of lead-in layers inseparably applied to semiconductor body (EPO)

257/E23.019Consisting of layered constructions comprising conductive layers and insulating layers, e.g., planar contacts (EPO)

257/E23.02Bonding areas, e.g., pads (EPO)

2 439/791 (0 OR, 2 XR)

Class 439 ELECTRICAL CONNECTORS

439/775 .METALLIC CONNECTOR OR CONTACT HAVING MOVABLE OR RESILIENT SECURING PART

439/790 ..Single operator for securing and joining plural conductors

439/791 ...Single screw-threaded operator

2 136/228 (1 OR, 1 XR)

Class 136 BATTERIES: THERMOELECTRIC AND PHOTOELECTRIC

136/200 .THERMOELECTRIC
 136/228 ..One junction element surrounded by another junction
 element
 2 257/E21.531 (0 OR, 2 XR)
 Class 257 ACTIVE SOLID-STATE DEVICES (E.G., TRANSISTORS, SOLID-STATE
 DIODES)
 257/E21.001 .PROCESSES OR APPARATUS ADAPTED FOR MANUFACTURE OR
 TREATMENT OF SEMICONDUCTOR OR SOLID-STATE DEVICES OR OF PARTS THEREOF (EPO)
 257/E21.521 ..Testing or measuring during manufacture or treatment or
 reliability measurement, i.e., testing of parts followed by no processing which
 modifies parts as such (EPO)
 257/E21.529Measuring as part of manufacturing process (EPO)
 257/E21.531For electrical parameters, e.g., resistance,
 deep-levels, CV, diffusions by electrical means (EPO)
 2 72/458 (2 OR, 0 XR)
 Class 72 METAL DEFORMING
 72/457 .BY OR WITH WORK-CONSTRAINER AND/OR MANIPULATED WORK-FORCER
 72/458 ..Comprising lever manipulated to force work
 2 72/479 (0 OR, 2 XR)
 Class 72 METAL DEFORMING
 72/462 .TOOL AND/OR TOOL HOLDER
 72/476 ..Having unitary tool-face
 72/479 ...With elongated extension fixed to tool face in use (e.g.,
 handle or shank)

10826954_CLS.txt

Most frequently occurring classifications of patents returned
from a search of 10826954 on Dec 18 , 2006

Original Classifications

| | |
|---|---------|
| 8 | 324/754 |
| 4 | 324/761 |
| 4 | 439/66 |
| 4 | 324/758 |
| 2 | 257/751 |
| 2 | 324/762 |
| 2 | 72/458 |

Cross-Reference Classifications

| | |
|---|-------------|
| 6 | 324/754 |
| 5 | 324/72.5 |
| 3 | 324/757 |
| 3 | 977/875 |
| 3 | 257/E23.021 |
| 3 | 257/E23.078 |
| 2 | 257/E23.02 |
| 2 | 439/791 |
| 2 | 204/403.01 |
| 2 | 257/E21.531 |
| 2 | 72/479 |

Combined Classifications

| | |
|----|-------------|
| 14 | 324/754 |
| 5 | 324/72.5 |
| 5 | 324/758 |
| 4 | 324/761 |
| 4 | 324/757 |
| 4 | 439/66 |
| 3 | 977/875 |
| 3 | 324/762 |
| 3 | 204/403.01 |
| 3 | 257/E23.021 |
| 3 | 257/E23.078 |
| 2 | 257/751 |
| 2 | 257/E23.02 |
| 2 | 439/791 |
| 2 | 136/228 |
| 2 | 257/E21.531 |
| 2 | 72/458 |
| 2 | 72/479 |

Jan. 15, 2002

Sheet 1 of 6

US 6,339,257 B1

[illegible]

(3) Referring to FIGS. 1 and 2, an interlayer insulating film 2 including a silicon oxide film is formed on a silicon substrate 1. An interconnection layer 3 including aluminum is formed on interlayer insulating film 2. An interlayer insulating film 4 as a first insulating layer including a silicon oxide film is formed to cover interconnection layer 3. A via hole 5 is formed in interlayer insulating film 4 as a first hole leading to interconnection layer 3. A length of a side of the via hole (a length corresponding to W.sub.1 in FIG. 1) is about 100 .mu.m. A depth of the via hole is about 1 .mu.m. Via hole 5 allows a surface of interconnection layer 3 to be exposed. A titanium (Ti) layer 9 as a first intermediate layer and a titanium nitride (TiN) layer 10 as a second intermediate layer are formed on the exposed surface of interconnection layer 3, a sidewall of via hole 5 and a surface of interlayer insulating film 4. Titanium layer 9 and titanium nitride layer 10 form the intermediate layer. Titanium layer 9 is in contact with interconnection layer 3 and titanium nitride layer 10. A sidewall conductive layer 8 as a sidewall conductive layer including tungsten is formed in contact with

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consultants
SPARKAR
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(19) United States

(12) Patent Application Publication (10) Pub. No.: US 2002/0011669 A1
FUJIKI et al. (4) Pub. Date: Jan. 31, 2002

(54) SEMICONDUCTOR DEVICE

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(*) Notes: This is a publication of a continued prosecution application (CPA) filed under 37 CFR 1.53(d).

(21) Appl. No.: 09/333,338

(22) Filed: Jul. 13, 1999

(30) Foreign Applications Priority Data

Jan. 24, 1999 (JP) 11-019841 (P)

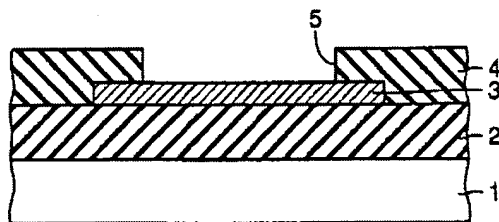
Publication Classification

(51) Int. Cl. 7 B01L 23/48; H01L 25/52

(52) U.S. Cl. 257/781

(57) ABSTRACT

A semiconductor device which is provided with enhanced reliability and capable of preventing cracking of a layer below an interconnection layer and separation of the interconnection layer and a bonding pad electrode layer. The semiconductor device includes: an interconnection layer including a conductive material formed on a silicon substrate; an intermediate layer formed in contact with the interconnection layer and including a titanium layer and a titanium silicide layer; and a bonding pad electrode layer which is in contact with the intermediate layer.



DOCUMENT-IDENTIFIER: US 20020011669 A1
TITLE: SEMICONDUCTOR DEVICE

Abstract Paragraph - ABTX (1):

A semiconductor device which is provided with enhanced reliability and capable of preventing cracking of a layer below an interconnection layer and separation of the interconnection layer and a bonding pad electrode layer. The semiconductor device includes: an interconnection layer including a conductive material formed on a silicon substrate; an intermediate layer formed in contact with the interconnection layer and including a titanium layer and a titanium nitride layer; and a bonding pad electrode layer which is in contact with the intermediate layer.

Pre-Grant Publication (PGPub) Document Number - PGNR (1):

20020011669

Current US Classification, US Primary Class/Subclass - CCPR (1):

257/751

Current US Classification, US Secondary Class/Subclass - CCSR (1):

257/E23.02

Summary of Invention Paragraph - BSTX (20):

[0018] A semiconductor device according to one aspect of the present invention includes an interconnection layer, an intermediate layer and a bonding pad electrode layer. The interconnection layer is formed on a semiconductor substrate. The intermediate layer is formed in contact with the interconnection layer and includes at least one material selected from a group of titanium, molybdenum, tungsten, titanium silicide, molybdenum silicide, tungsten silicide, titanium nitride, molybdenum nitride and tungsten nitride. The bonding pad electrode layer is in contact with the intermediate layer.

Summary of Invention Paragraph - BSTX (21):

[0019] In the semiconductor device having the above described structure, a strength of the intermediate layer is high as it includes at

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